

U.S. Application No. 10/671,080
Attorney Docket No. 2003B095
Office Action dated June 27/2007
Amendment and Response dated August 27, 2007

REMARKS

This RCE application contains claims 19-51 directed to a catalytic process using a combination of an intermediate pore size catalyst and a different structure type catalyst which has a pore size index for one channel which is less than that of the intermediate pore size catalyst and recovering an increased amount of C3 olefins over the single intermediate or smaller catalyst.

35 USC 102(b) Rejection of Claims 19, 22-24, 46, 48, and 51 over Swan III et al. U.S. Published Patent Application No. 2001/0042700A1 ("Swan")

The present rejection relies on the Swan disclosure for rejection of claims. Applicants respectfully traverse because the reference does not disclose a catalytic cracking process using two intermediate (or an intermediate and a smaller) pore size molecular sieves and recovering an increased propylene production over either of these sieves independently.

Independent claim 19 recites that the process uses "a first molecular sieve component having an intermediate pore size ... [and] a second molecular sieve component having a structure type that is different from said first molecular sieve and [has] a pore size index of at least one channel of said second molecular sieve which is less than the pore size index of at least one channel of said first molecular sieve". The reference is contrary to this claimed limitation, disclosing a large pore zeolite, optionally combined with a single shape selective zeolite.

With regard to the anticipation rejection of claim 19 of paragraph 4 of the Office Action:

Swan paragraph 0010 does teach a naphtha FCC process to produce light olefins;

U.S. Application No. 10/671,080
Attorney Docket No. 2003B095
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Swan paragraph 0023 does teach a large pore zeolite, a shape selective zeolite, and mixtures thereof;

Swan paragraph 0026 does teach 0.1 to 10 micron zeolites; and

Swan paragraph 0030 does teach medium pore zeolites.

However, Swan does not disclose, teach, or suggest a combination of medium pore zeolites different from each other. Swan teaches only a combination of a large pore zeolite and a medium pore zeolite. The disclosure of two medium pore zeolites is not disclosed, and is contrary to Swan so the rejection must fail.

Swan only suggests the option of adding a medium pore zeolite to the large pore zeolite cracking catalyst. Swan never suggests a combination of medium pore zeolites or a combination of a medium with another zeolite having a smaller pore. Accordingly, the claim feature that one molecular sieve will have a pore size index of at least one channel smaller than the medium pore zeolite, is not met. Swans other zeolite will only have a channel *larger* than the medium pore zeolite. Thus, it cannot "be seen that Swan uses a combination of medium-pore zeolites which are different from each other." This is contrary to the clear teaching of Swan.

Swan does not complete the invention or suggest it to the skilled artisan because Swan requires a large pore catalyst such as zeolite Y, optionally in combination with only one other intermediate pore size molecular sieve. Swan suggests Y plus beta, Y plus ZSM-5, or Y plus SAPO. Swan did not recognize that using two intermediate pore size molecular sieves would even further improve propylene production. Thus, Swan did not recognize, teach, or even suggest the combination of two intermediate pore size molecular sieves (or an intermediate with a smaller sieve).

Failure of Swan to recognize the combination is not surprising because Swan was directed to a high boiling point feed (see Swan paragraph 0013) with a recycle process that included hydrogenation of aromatics. Also, there is nothing to urge Swan or the

- 8 -

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U.S. Application No. 10/671,080
Attorney Docket No. 2003B095
Office Action dated June 27/2007
Amendment and Response dated August 27, 2007

skilled artisan to go to the expense, trouble, and additional preparation time (all amounting to additional cost) of using two intermediate pore size molecular sieves. Use of one was merely optional to Swan. Why would one add another medium pore zeolite? What teaching suggests this and what motivates this? Swan was directed to improve propylene yields from the process recycle and especially from fully hydroprocessing the cycle oil so as to make decahydronaphthalenes the prevalent hydrogenated aromatic and provide more propylene therefrom. Swan was focused on making the heavily hydrogenated species available, not on the combination of catalysts.

The additional rejections of claims 22-24 and 33-35; 25-29 and 37-41; 30; 31; 32; 36 and 42; 43, 44, and 48; 46; and 51; while disclosing various other related features, do not disclose the claimed combination of catalysts. In fact, the recited catalyst combinations referred to are consistent with the Swan teaching of a large pore and a medium pore zeolite, and are contrary to the claimed invention of two medium or a medium and a smaller zeolite.

35 USC 103(a) Rejection of Claims 20, 21, 45, 47, 49, and 50 over Swan

Consideration of the above remarks are requested with respect to this rejection also. With respect to the obviousness rejections of paragraph 17 of the Office Action:

Swan paragraphs 0012 and 0013 do disclose a naphtha feed;
Swan paragraph 0029 does describe the pore size of medium pore zeolites;
Swan paragraph 0013 does disclose the noted boiling range hydrocarbon oils; and
Swan Table 3 does disclose overlapping ranges of butylenes and propylene,

However, the combination of Swan paragraphs 0028 and 0023 does not teach or suggest using first a Y and a medium pore zeolite, and then a third zeolite. Rather both paragraphs describe the Swan catalyst of Y and beta. No third catalyst component is taught or suggested.

- 9 -

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U.S. Application No. 10/671,080
Attorney Docket No. 2003B095
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Swan paragraph 0023 merely recites that the zeolite Y (or alternatively other large pore catalyst) may comprise one or more individual particles (not catalyst species) and more than one type of particle. Paragraph 0023 goes on to indicate in the last sentence that individual particle may be a large pore zeolite, or a shape-selective zeolite, or a mixture of two catalysts, contained in the individual particle.

Swan paragraph 0028 merely indicates the large pore zeolite is either Y or amorphous acidic material, combined with ZSM-5 shape selective zeolite.

Both paragraphs teach only two catalysts.

Both paragraphs require a large pore zeolite.

Neither paragraph teaches or suggests combinations of medium pore zeolites.

Rather, paragraph 0023 describes the particles and generalizes with a "shape-selective zeolite" and paragraph 0028 specifies that the shape selective zeolite is ZSM-5. Paragraph 0023 gives the genus and paragraph 0028 gives the species.

It is inaccurate to portray the combination of paragraphs 0023 and 0028 as teaching a large pore plus two medium pore zeolites. Three catalysts are not taught or suggested. Swan was concerned with a recycle process using catalyst to produce more C3 olefin after producing fully saturated decahydronaphthalenes. The examples of Swan are consistent with the teachings discussed above, using first Y and then a combination of Y with ZSM-5.

Swan paragraph 0055 further evidences the unobviousness of the invention when Swan states that "...further increases ... can be obtained when a shape selective catalyst

U.S. Application No. 10/671,080
Attorney Docket No. 2003B095
Office Action dated June 27/2007
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is combined ..." (emphasis added). Swan was not directed to, and did not recognize the combination of a medium pore and another smaller channel zeolite as claimed.

In summary, Swan does not provide to the skilled artisan the missing combination of the claims and obviousness is not found. Reconsideration and allowance of all claims are respectfully requested.

Respectfully submitted,

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